

REMARKS

In the Final Office Action, the Examiner rejected claims 1-32. No claims are amended by this Response. In view of following remarks, Applicants respectfully request reconsideration and allowance of all pending claims.

Claim Rejections under Doctrine of Obviousness-Type Double Patenting

In the Final Office Action, the Examiner rejected claims 1-32 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 of U.S. Patent No. 7,035,159 (hereinafter referred to as "the Janzen reference"). Further, the Examiner provisionally rejected claims 1-32 as being unpatentable over claims 1-30 of copending Application No. 10/816,241 (hereinafter referred to as "the '241 application"). Although Applicants do not necessarily agree with the Examiner's assertion, Applicants are amenable to filing a terminal disclaimer upon allowance of the claims in the present application. Any such filing will, of course, be affected by any restrictions or election requirements made by the Examiner during the course of prosecution. Accordingly, Applicants respectfully request that the Examiner hold in abeyance the double-patenting rejection until the present claims are determined to be allowable.

Claim Rejections under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-5 and 21-24 under 35 U.S.C. § 103(a) as being unpatentable over Trick (U.S. Patent No. 5,995,405, hereafter referred to as "Trick") in view of Abrahams et al. (U.S. Publication No. 2004/0078454, hereafter referred to as "Abrahams") and

further in view of Nerl (U.S. Publication No. 2002/0016897, hereafter referred to as "Nerl"); rejected claims 7-11 and 25-32 under 35 U.S.C. § 103(a) as being unpatentable over Trick in view of Abrahams; rejected claims 6 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Trick in view of Abrahams and further in view of allegedly admitted prior art; and rejected claims 13-20 under 35 U.S.C. § 103(a) as being unpatentable over Abrahams reference in view of Nerl.

Applicants respectfully traverse these rejections.

Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (B.P.A.I. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d. 1430 (Fed. Cir. 1990). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985).

Summary of Applicants' Arguments and Remarks Regarding Examiner's "Response to Argument" Section of the Final Office Action

In an attempt to avoid an unnecessary Appeal, Applicants provide the following summary regarding the subject matter recited in independent claims 1, 7, 13, 17, 21, 25 and 29. Applicants respectfully request that the Examiner carefully consider the following summary and the subsequent remarks pertaining to the specific rejections provided by the Examiner.

Throughout Applicants' specification, including the claims, and throughout the prosecution history of the present application, Applicants have repeatedly distinguished between operating current values that are: 1) device-type specific; 2) manufacturing lot specific; and 3) device specific. In accordance with embodiments recited in various independent claims, embodiments of the invention are directed to the utilization of lot specific or device specific operating current values of volatile memory devices. By measuring each device and storing values associated with each specific device or storing values associated with a particular lot, rather than relying on device-type characterizations, as in the prior art, the operating current values for a specific device or operating current values corresponding to a specific manufacturing lot in which a particular device was manufactured, operation of the devices may be optimized.

As would be fully appreciated by those skilled in the art devices are fabricated in a manufacturing lot. For example, 1000 devices may be manufactured in a particular lot before the devices are tested and parameters are adjusted. However, 1,000,000 devices of that type may be manufactured overall, in 1000 different lots. As explained in the present specification, each device has a particular operating current value. Applicants propose that rather than setting operating

current values to account for the worst case scenarios associated with a particular device-type (i.e., using data acquired from prior testing of other devices of that particular device-type), specific and unique operating current values can be obtained from each specific device or manufacturing lot and those device specific or lot specific values can be used to optimize operation of that specific device.

Specifically, independent claims 1 and 21 recite utilization of “operating currents *uniquely* corresponding to a *lot* in which the [plurality of] volatile memory devices were manufactured,” rather than the general device-specific operating currents that are typically listed on data sheets. (Emphasis added.) By implementing the *manufacturing lot specific operating current values*, claims 1 and 21 provide a more accurate technique than the typical data sheet-based methods. Specification, p. 12, ll. 24-25, p. 13, l. 1.

Independent claims 7, 25, and 29 recite the utilization of “operating currents *uniquely* corresponding to *each* of the plurality of *memory devices*,” rather than the general device-type specific operating current currents that are typically listed on data sheets. (Emphasis added.) By implementing the operating currents *specific to each unique memory device*, claims 7, 25, and 29 provide a more accurate technique than the typical data sheet-based methods. Specification, p. 12, ll. 24-25, p. 13, l. 1.

Independent claim 13 recites a method of manufacturing a memory module comprising, *inter alia*, “measuring operating current values in each of a plurality of volatile memory devices,”

and “storing each of the operating current values corresponding to each of the volatile memory devices in a non-volatile memory device.” That is, *actual operating current values* are measured for each volatile memory device and those values are stored for later use, to optimize the performance of that particular device, rather than setting operating current values in accordance with worst case value to optimize the performance of that particular device, rather than setting operating current values in accordance with worst case values for that *type* of device.

Independent claim 17 recites, *inter alia*, “measuring operating current values in each of a plurality of volatile memory devices, wherein the plurality of volatile memory devices correspond to a single manufacturing lot; calculating average operating current values for the manufacturing lot,” and “storing the average operating current values in a non-volatile memory device.” That is, *actual operating current values* are measured for each volatile memory device and average operating current values for the manufacturing lot in which those specific devices were manufactured are calculated using the measured values from the specific devices. Those values are stored for later use, to optimize the performance of that particular device by setting operating current values in accordance with the average operating current values for the lot, rather than setting operating current values in accordance with worst case value to optimize the performance of that particular device, rather than setting operating current values in accordance with worst case values for that *type* of device.

Applicants stress that this utilization of *device specific* or *manufacturing lot specific* operating current values, which are based upon actual values measure for those specific devices, is

not taught by the cited references. Indeed, the Abrahams reference, the Nerl reference and the Trick reference each disclose using device-type specific operating current values. Indeed, this is completely consistent with the Applicants' description of the prior art and in stark contrast to each of Applicants' claims.

In the Response to Arguments section of the Final Office Action, the Examiner again cited paragraphs [0009] and [0022] of Abrahams and asserted that because an EEPROM is used to store operating current values corresponding to the Field Replaceable Units (FRUs), that these operating current values are lot specific because a "FRU represents a lot." The Examiner also asserts that each of the storage devices 100A-100I which make up the storage array 101 make up a single manufacturing lot. There is no logical basis to these assertions. A FRU only refers to a type of device and has absolutely no correlation or determinable relationship with a manufacturing lot in which a specific FRU was manufactured. There is absolutely no reference or discussion, whatsoever in the Abraham reference regarding a manufacturing lot, much less employing unique operating current values measured for a particular device to either store those values for later access or to calculate lot specific values based on the uniquely measured operating currents on those devices. Further, there is absolutely no basis for asserting the each of the storage devices 100A-100I of the storage array 101 is from the same manufacturing lot or that operating current values calculated from operating current values measured on those particular storage devices 100A-100I are utilized in any way. The only teaching or suggestion provided in the Abraham reference is to utilize device-type specific (e.g., FRU) operating current values, rather than device specific or lot specific values as recited in the present claims.

Further, in the Response to Arguments Section of the Final Office Action, the Examiner again cited col. 1, lines 30-42 of the Trick reference as providing the teaching or suggestion for utilizing operating parameters uniquely corresponding to a lot in which a specific volatile memory device is manufactured. Once again, Applicants assert that there is simply no basis for this assertion. Trick merely discloses, in general terms, the functions of an EEPROM, but does not discuss the operating parameters of the associated In Line Memory Module (IMM). Trick, col. 1, lines 43-56. To the extent that Trick discloses that configuration information is stored on the EEPROM, Trick does not teach or suggest that the configuration information is manufacturing lot-specific configuration information. *See id.* at col. 1, lines 31-34. As with the Abrahams reference, at best, Trick merely discloses storing device-type specific configuration information, rather than device specific or lot specific values as recited in the present claims.

Finally, Applicants assert that Nerl fails to remedy the deficiencies of either Trick or Abrahams. Indeed, the Examiner merely referred to Nerl for its alleged teaching that it is well known in the art that a DIMM can be an FRU. Accordingly, even if Nerl disclosed what is asserted by the Examiner, it does not remedy the deficiencies discussed above.

In summary, and as discussed in more detail below, each of the present independent claims is directed to measuring, storing and/or utilizing unique operating current values for specific devices and using those values to set operating parameters, or calculating averages based on those measured and unique values corresponding to those devices in a particular manufacturing lot. In

stark contrast, Abrahams, Trick and Nerl only disclose or suggest utilizing device-type specific values. Accordingly, none of the references, taken alone or in combination, teaches or suggests the subject matter recited in any of the independent claim.

Claims 1-5 and 21-24 Are Not Obvious Over Trick in View of Abrahams and Nerl

Computer device manufacturers design memory devices to operate within a predetermined temperature range. Specification, p. 2, ll. 19-20. Given that the memory devices in a computer system employ electric current to perform their intended functions, the amount of heat in the device is a function of the flow of current through the device. Specification, p. 3, ll. 4-7. Accordingly, memory devices are typically accompanied by data sheets specifying operating currents for the devices in various modes and conditions. Specification, p. 3, ll. 21-23. These data sheets correspond to a given type of memory chip and represent the worst case scenario for that particular type of device. Specification, p. 4, ll. 7-9. Any given memory device can often operate at currents 15-40% outside of the data sheet values. Specification, p. 3, ll. 10-12. Therefore, by implementing the data sheet values, the full extent of the device's capabilities are not being exploited. Specification, p. 3, ll. 12-14.

Accordingly, independent claims 1 and 21 of the present application recite the utilization of "operating currents *uniquely* corresponding to a *lot* in which the [plurality of] volatile memory devices were manufactured," rather than the general device-specific operating currents that are typically listed on data sheets. (Emphasis added.) By implementing the lot-specific operating current values, claims 1 and 21 provide a more accurate technique than the typical data sheet-

based methods. Specification, p. 12, ll. 24-25, p. 13, l. 1. Consequently, the method of claim 1 and the memory module of claim 21 result in a more efficient use of the specific memory device's capabilities.

Applicants respectfully submit that neither Trick, Abrahams, nor Nerl, alone or in combination, disclose each and every feature of independent claims 1 and 21. Specifically, none of the aforementioned references teaches utilizing operating currents *uniquely* corresponding to a *lot* in which the memory devices were manufactured, as recited in claims 1 and 21.

Regarding Trick, the Examiner asserted that Trick teaches utilizing operating parameters uniquely corresponding to a lot in which the volatile memory devices were manufactured. Office Action, p. 4. Specifically, the Examiner asserted that the electrically erasable programmable ROM (EEPROM) disclosed in Trick is associated with In Line Memory Modules (IMMs) and, therefore, identifies the lot of memory devices. *Id.* Applicants respectfully disagree and respectfully submit that Trick does not teach operating parameters uniquely corresponding to a lot in which the volatile memory devices were manufactured, as asserted by the Examiner.

Rather, Trick discloses a mechanism for adapting an IMM so that it may be configured to accommodate a standard EEPROM or a "daisy chain" EEPROM. Trick, col. 2, ll. 21-25. Trick is not concerned with improving the accuracy of determining operating parameters of memory devices, specifically the operating current, as in the present application. Indeed, Trick discloses in general terms the functions of the EEPROM, but does not discuss the operating parameters of the

IMM. Trick, col. 1, ll. 43-56. To the extent that Trick discloses that configuration information is stored on the EEPROM, Trick fails to teach that the configuration information is lot-specific configuration information. *See id.* at col. 1, ll. 31-34. Therefore, Trick does not disclose the utilization of “operating currents uniquely corresponding to a lot in which the [plurality of] volatile memory devices were manufactured,” as recited by independent claims 1 and 21.

Further, Applicants assert that the Examiner’s attempt to remedy the deficiencies of Trick by citing Abrahams is insufficient. The Examiner merely relied on Abrahams for its alleged disclosure of reading operating current values from a non-volatile memory device on a memory module. Office Action, p. 5. To the extent Abrahams may disclose the reading of operating current values, nowhere does Abrahams teach or suggest that those operating current values “uniquely correspond[] to a lot in which the volatile memory devices were manufactured,” as recited in independent claims 1 and 21. For example, Abrahams provides that “[t]he operational parameters may be *specific to each type of component*. For example, disk drives may have different operational parameters than array controllers.” Abrahams, p. 2, ¶ 23 (emphasis added). Therefore, the specification in Abrahams teaches utilizing parameters specific to a particular type of component and not lot-specific parameters. In fact, Abrahams is devoid of any mention of lot-specific parameters such as lot-specific current values. The inaccuracy and inefficiency associated with using values associated with a particular type of component is exactly the problem that implementation of the present invention is designed to eliminate. Therefore, Abrahams does not disclose the utilization of “operating currents uniquely corresponding to a lot in which the [plurality of] volatile memory devices were manufactured,” as recited in claims 1 and 21.

Applicants further assert that Nerl fails to remedy the deficiencies of either Trick or Abrahams. Indeed, the Examiner merely referred to Nerl for its alleged teaching that it is well known in the art that a DIMM can be an FRU. Office Action, p. 5. Accordingly, even if Nerl disclosed what is asserted by the Examiner, it does not remedy the deficiencies discussed above.

In view of the remarks set forth above, Applicants respectfully submit that independent claims 1 and 21 and their dependent claims are not rendered obvious by the cited combination. Accordingly, Applicants request withdrawal of the Examiner's rejection and the allowance of claims 1-5 and 21-24.

Claims 7-11 and 25-32 Are Not Obvious Over Trick in View of Abrahams

Independent claims 7, 25, and 29 of the present application recite the utilization of "operating currents uniquely corresponding to each of the plurality of memory devices," rather than the general device-type specific operating current currents that are typically listed on data sheets. By implementing the operating currents specific to each unique memory device, claims 7, 25, and 29 provide a more accurate technique than the typical data sheet-based methods. Specification, p. 12, ll. 24-25, p. 13, l. 1. Consequently, the method of claim 7, the memory module of claim 25, and the computer system of claim 29 result in a more efficient use of the specific memory device's capabilities.

Applicants respectfully submit that neither Trick nor Abrahams, alone or in combination,

disclose each and every feature of independent claims 7, 25, and 29. Indeed, given that the operating currents specific to each memory device recited in independent claims 7, 25, and 29 offer the same advantages as the lot-specific values utilized in independent claims 1 and 21, Applicants rely on the remarks presented above to demonstrate that neither Trick nor Abrahams teach the utilization of operating currents *uniquely* corresponding to *each* of a plurality of memory devices. Accordingly, Applicants request withdrawal of the Examiner's rejection and allowance of claims 7-11 and 25-32.

Claims 6 and 12 Are Not Obvious Over Trick in View of Abrahams and the Allegedly Admitted Prior Art

In the rejection of dependent claims 6 and 12, the Examiner asserted that Trick in view of Abrahams and further in view of the allegedly admitted prior art discloses all of the recited features. However, despite the Examiner's assertion, Applicants respectfully assert that the rejection is deficient for at least two reasons. First, Applicants submit that no prior art has been *admitted* in the present application. Secondly, even assuming the background section is prior art, which Applicants do not admit, it does not remedy the deficiencies of Trick and Abrahams.

First, Applicants note that the present application does not *admit* any prior art. Pursuant to M.P.E.P. § 2129, the statements of an applicant can only be used as an admission if the applicant explicitly admits that something is "prior art." For example, where the specification identifies work done by another as "prior art," the subject matter so identified is treated as admitted prior art. *In re Nomiya*, 509 F.2d 566, 571, 184 U.S.P.Q. 607, 611 (C.C.P.A. 1975). However, simply *mentioning* something in the paragraphs of the "Description of the Related Art"

section, which is herein referred to as the "background section," is *not* an explicit admission. Indeed, the first paragraph of the background section specifically indicates that statements in the background section should *not* be read as admissions of prior art. *See* Application, p. 1, ll. 17-18. Accordingly, the passages relied upon by the Examiner and alleged to be prior art are, in fact, not an admission of prior art by Applicants. Therefore, the Examiner has improperly asserted that the passages are prior art and improperly relied upon these passages against claims 6 and 12.

Second, even assuming the background section is prior art, which Applicants do not admit, it does not remedy the above-discussed deficiencies of Trick and Abrahams. The Examiner relied on the allegedly admitted prior art for the teaching of throttling the memory. However, the allegedly admitted prior art does not obviate the deficiencies of Trick and Abrahams discussed above with reference to independent claims 1 and 7. Accordingly, Applicants submit that Trick, Abrahams, and the allegedly admitted prior art, alone or in combination, do not disclose each and every feature of dependent claims 6 and 12.

Accordingly, Applicants respectfully request withdrawal of the rejection of claims 6 and 12 under 35 U.S.C. § 103.

Claims 13-20 Are Not Obvious Over Abrahams in View of Nerl

Rejection of Claim 13

In accordance with embodiments of the present techniques, memory devices may be individually tested such that device-specific operating current values uniquely corresponding to

each memory device can be recorded and stored in a database. Specification, p. 13, ll. 20-23. In one embodiment, the operating current values in the database may be used during fabrication of a memory module wherein the database is accessed during fabrication and a non-volatile memory device may be uniquely programmed in accordance with the specific operating current values for the particular memory devices on the memory module. Specification, p. 13, l. 13 – p. 14, l. 4. After fabrication and programming of the non-volatile memory device, a memory module can be shipped for implementation in a system and operating current values may be accessed by the system from the non-volatile memory device such that the system can be configured to operate optimally within the capabilities of the particular memory devices. Specification, p. 14, ll. 4-9.

Accordingly, claim 13 recites a method of manufacturing a memory module comprising, *inter alia*, “measuring operating current values in each of a plurality of volatile memory devices;” and “storing each of the operating current values corresponding to each of the volatile memory devices in a non-volatile memory device.”

In the rejection of claim 13, the Examiner stated that Abrahams discloses “measuring operating current values in each of a plurality of memory devices (lines 13-15 of page 1).” Office Action, p. 13. The Examiner further stated that Abrahams discloses “storing each of the operating current values corresponding to each of the plurality of memory devices in a non-volatile memory device.” *Id.* Applicants respectfully disagree with the Examiner’s assertions regarding Abrahams.

Claim 13 recites measuring operating current values in each of a plurality of volatile memory devices and storing each of the operating current values in a non-volatile memory device. While Applicants agree that Abrahams does teach storing operational parameters in a non-volatile memory device, these operational parameters are specific to a type of component, such as those found on a component's data sheet. Abrahams, p. 2, ¶ 22. The operational parameters that may be stored on the non-volatile memory device are not the operating current values that were measured for each of a plurality of volatile memory devices. Indeed, to the extent Abrahams discloses the measuring of operational parameters, Applicants respectfully submit that Abrahams discloses the measuring of the current operating conditions of the component. Abrahams, p. 1, ¶ 11. The current operating conditions of the component then may be compared to the operational parameters for a type of component that may be stored in the non-volatile memory. *Id.* Accordingly, Abrahams does not disclose measuring operating current values in each of a plurality of memory devices and storing each of the operating current values in a non-volatile memory device.

Applicants further assert that Nerl fails to remedy the deficiencies of Abrahams. Indeed, the Examiner merely referred to Nerl for its alleged teaching that it is well known in the art that a DIMM can be an FRU. Office Action, p. 14. Accordingly, even if Nerl disclosed what is asserted by the Examiner, it does not remedy the deficiencies discussed above.

In view of the remarks set forth above, Applicants respectfully submit that independent claim 13 and its dependent claims are not rendered obvious by the cited combination.

Accordingly, Applicants request withdrawal of the Examiner's rejection and allowance of claims 13-16.

Rejection of Claim 17

Claim 17 recites, *inter alia*, "measuring operating current values in each of a plurality of volatile memory devices, wherein the plurality of volatile memory devices correspond to a single manufacturing lot; calculating average operating current values for the manufacturing lot;" and "storing the average operating current values in a non-volatile memory device."

As discussed above with respect to the rejection of claim 13, Abrahams does not disclose measuring operating current values in each of a plurality of volatile memory devices. Indeed, to the extent Abrahams discloses the measuring of operational parameters, Applicants respectfully submit that Abrahams discloses the measuring of the current operating conditions of the component. Abrahams, p. 1, ¶ 11. Further, nowhere does Abrahams disclose that the operating current values are measured for a plurality of volatile memory devices that correspond to a single manufacturing lot. Accordingly, Abrahams does not disclose measuring operating current values in each of a plurality of volatile memory devices, wherein the plurality of memory devices correspond to a single manufacturing lot.

Moreover, in contrast to the present claims and as admitted by the Examiner, Abrahams also does not disclose "calculating *average* operating current values for the manufacturing lot" and "storing the *average* operating current values in a non-volatile memory device," as recited by

independent claim 17. *See* Office Action, p. 14. Rather, the Examiner argues that “one of ordinary skill in the art would have been motivated to store average current corresponding to the lot in the non-volatile memory depending on his design choice.” *Id.* Applicants respectfully disagree and submit that the Examiner has not demonstrated a “convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). Indeed, as previously mentioned, Abrahams is devoid of any disclosure regarding lot-specific parameters, such as the average operating currents values for the manufacturing lot of claim 17. Rather, to the extent Abrahams discloses that operating parameters are stored in a non-volatile memory, Abrahams discloses the use of general device-specific parameters. For example, Abrahams discloses that “[t]he operational parameters may be *specific to each type of component*.” Abrahams, p. 2, ¶ 23 (emphasis added). In view of this teach of Abrahams, there is no convincing line of reasoning as to why one of ordinary skill in the art would modify Abrahams in the manner recited in independent claim 17.

Applicants further assert that Nerl fails to remedy the deficiencies of Abrahams. Indeed, the Examiner merely referred to Nerl for its alleged teaching that it is well known in the art that a DIMM can be an FRU. Office Action, p. 14. Accordingly, even if Nerl disclosed what is asserted by the Examiner, it does not remedy the deficiencies discussed above.

In view of the remarks set forth above, Applicants respectfully submit that independent claim 17 and its dependent claims are not rendered obvious by the cited combination.

Accordingly, Applicants request withdrawal of the Examiner's rejection and allowance of claims 17-20.

Authorization for Extensions of Time and Payment of Fees

Applicants do not believe that any fees are due at this time. However, if any fees, including fees for extensions of time and other reasons, are deemed necessary to advance prosecution of the present application, at this or any other time, Applicants hereby authorize the Commissioner to charge such requisite fees to Deposit Account No. 06-1315; Order No. MICS:0103/FLE/MAN (No. 02-1327). In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request thereof.

Conclusion

Applicants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

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